

CLAIMS

We claim:

1. A data communication system for communicating over a packet network, said data communication system comprising:

5 a first terminal device for initiating a request for a communication session and for transferring data;

a first gateway corresponding to said first terminal device and adapted to establish the communication session based on the request of said first terminal device;

10 a second terminal device adapted to communicate over said packet network with said first terminal device; and

a second gateway corresponding to said second terminal device and adapted to establish the communication session with said first gateway through said packet network such that said first terminal device can communicate with
15 said second terminal device;

wherein said first gateway, said packet network, and said second gateway provide a virtual end-to-end communication connection between said first terminal device and said second terminal device such that said first terminal device and said second terminal device operate as if directly connected.

20 2. The data communication system of claim 1, wherein said virtual end-to-end communication connection comprises a plurality of independent transmission segments, wherein each said independent transmission segment is adapted to at least one of a detection, correction and retransmission of

erroneous data independently of any errors in other independent transmission segments.

3. The data communication system of claim 2, wherein said independent transmission segments comprise a communication connection
5 between said first terminal device and said first gateway, said first gateway and said second gateway, and said second terminal device and said second gateway.

4. The data communication system of claim 1, wherein said virtual
10 end-to-end communication connection comprises a data link layer communication session comprising the initial establishment of first data link layer between said first terminal device and said first gateway and the initial establishment of a second data link layer between said second gateway and said second terminal device

5. The data communication system of claim 4, wherein said data link
15 layer communication session includes negotiation and establishment of protocols for communication after the initial establishment of said first data link layer and said second data link layer.

6. The data communication system of claim 1, wherein said virtual
end-to-end communication connection comprises:

20 a first physical link connection established between said first terminal device and said first gateway;

a second physical link connection established between said second terminal device and said second gateway; and

a common protocol between said first terminal device and said first gateway and between said second terminal device and said second gateway, said common protocol established by negotiations between said first gateway and said second gateway.

5 7. The data communication system of claim 6, wherein said common protocol is established after initial passive transport of the data.

8. The data communication system of claim 6, wherein said common protocol is established prior to the transmission of data and after harmonization of at least one working parameter.

10 9. The data communication system of claim 8, wherein said at least one working parameter comprises at least one of a K parameter, an N401 parameter, and an HDLC parameter.

15 10. The data communication system of claim 1, wherein said virtual end-to-end communication connection comprises a physical link connection, said physical link connection comprising:

a physical link between said first terminal device and said first gateway:

a physical link between said second terminal device and said second gateway; and

20 a mechanism for compensating for flow control problems during transfer of the data, wherein the data is physically transferred from said first terminal device to said second terminal device, and said mechanisms compensate for mismatches in rates for data transfer.

11. The data communication system of claim 1, wherein said second gateway is adapted to establish the communication session with said first

gateway through use of a transport protocol to provide at least one of error detection, correction and retransmission mechanisms within said data communication system, and

wherein said virtual end-to-end communication connection comprises
5 three independent virtual connections between said first terminal device and said first gateway, between said first gateway and said second gateway, and between said second gateway and said second terminal device.

12. The data communication system of claim 1, wherein said second gateway is adapted to establish the communication session with said first
10 gateway through use of a best effort protocol, said first terminal device and said second terminal device including data link layers, and

wherein erroneous data is detected by at least one of said first terminal and said second terminal, and a retransmission request is made by said at least one of said first terminal and said second terminal for correct data.

15 13. A method for communicating data through a packet network, said method comprising the steps of:

initiating a communication request from a first terminal device to a first gateway to connect to a second terminal device;

selectively contacting, with said first gateway, a second gateway
20 corresponding to said second terminal device;

establishing a communication session with said second device through said second gateway;

transferring the data from said first terminal device to said second terminal device through said packet network, wherein said first device and said second device communicate through a virtual end-to-end communication connection.

14. The method for communicating data of claim 13, wherein said step of initiating a communication request comprises the steps of: indicating to a central office a request to connect to said first gateway; and negotiating between said first device and said first gateway a plurality of communication options.

15. The method for communicating data of claim 14, wherein said step of initiating a communication request further comprises transparent recognition by said central office that said first terminal device requests connection to said first gateway.

16. The method for communicating data of claim 13, wherein said virtual end-to-end communication connection comprises a plurality of independent transmission segments, said independent transmission segments comprising a communication connection between said first terminal device and said first gateway, said first gateway and said second gateway, and said second terminal device and said second gateway, and wherein said step of establishing a communication session with said second terminal device through said second gateway comprises the steps of:

assessing communication capabilities of each of said independent segments; and

agreeing independently on a transport protocol for each of said independent segments.

17. The method for communicating data of claim 13, wherein said step of establishing a communication session with said second terminal device through said second gateway comprises the steps of:

assessing communication capabilities of said first terminal device and said
5 second terminal device;

determining a shared set of supported protocols between said first terminal device and said second terminal device; and

selecting from said shared set of supported protocols at least one protocol for use in communications between said first terminal device and said second
10 terminal device.

18. The method for communicating data of claim 17, wherein said step of selecting from said shared set of supported protocols comprises the forcing of a specific protocol for use in communications between said first terminal device and said second terminal device.

15 19. The method for communicating data of claim 17, wherein said step of selecting from said shared set of supported protocols comprises accepting a first common protocol encountered between said first device and said second device.

20. The method for communicating data of claim 13, wherein said step of establishing a communication session with said second terminal device through said second gateway comprises the steps of:

establishing a physical connection between said first terminal device and said first gateway and between said second terminal device and said second gateway;

negotiating a transport protocol and at least one working parameter between said first terminal device and said first gateway, between said first gateway and said second gateway, and between said second terminal device and said second gateway;

5 sending a frame signal to said first terminal device and said second terminal device indicative of said negotiating step being conducted;

 harmonizing said at least one working parameter between said first terminal device and said first gateway and between said second terminal device and said second gateway; and

10 sending a frame signal to said first terminal device and said second terminal device indicative of said harmonizing step being completed.

21. The method for communicating data of claim 20, wherein said step negotiating a transport protocol and at least one working parameter comprises selecting at least one of a K parameter, an N401 parameter, and an HDLC
15 parameter.

22. The method for communicating data of claim 20, wherein said step of sending a frame signal to said first terminal device and said second terminal device indicative of said negotiating step being conducted comprises sending an RNR frame signal.

20 23. The method for communicating data of claim 20, wherein said step of harmonizing said at least one working parameter between said first terminal device and said first gateway and between said second terminal device and said second gateway comprises sending an XID frame signal.

24. The method for communicating data of claim 20, wherein said step of sending a frame signal to said first terminal device and said second terminal device indicative of said harmonizing step being completed comprises sending an RR signal.

5 25. The method for communicating data of claim 20, wherein said step of establishing a communication session with said second terminal device through said second gateway further comprises the steps of

addressing timing considerations to prevent said first terminal device from interpreting that said first gateway does not support a data link layer protocol.

10 26. The method for communicating data of claim 25, wherein said step of addressing timing considerations comprises the step of stalling a handshaking process between said first terminal device and said first gateway and said second terminal device and said second gateway for selecting the data link layer protocol until a virtual end-to-end connection has been established between said
15 first terminal device and said second terminal device.

27. The method for communicating data of claim 25, wherein said step of addressing timing considerations comprises the step of extending at least one timeout value for at least one timer used to determine whether the data link layer protocol exists at said first terminal device and said second terminal device.

20 28. The method for communicating data of claim 13, wherein said method further comprises the step of:

terminating said communication session by providing a mechanism for respectively terminating a physical connection between said second terminal

device and said second gateway immediately after terminating a physical connection between said first terminal device and said first gateway.

29. The method for communicating data of claim 13, wherein said step of terminating said communication session by providing a mechanism further comprises said first gateway signaling said second gateway of an intent to terminate said communication session.